12.0 OPHTHALMOLOGY

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April 2015 updates include:

- NEW Chapters on Central Serous Retinopathy (12.18), Pigment Dispersion Syndrome (12.19), Peripheral Retinal Degeneration and Retinal Hole (12.20), including guidance on local board eligibility
- Updates to Refractive Surgery Chapter, including new surgical center for Class I Aviators (Wilford Hall, San Antonio), expanded pre-op limits for designated personnel, information on recommended wait times after surgery

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12.1 CATARACT

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AEROMEDICAL CONCERNS: Cataracts reduce visual acuity (VA). When the cataract involves the visual axis, visual acuity is most affected in bright sunlight and conditions of glare.

WAIVER: The condition is considered disqualifying. Once vision has deteriorated to less than 20/20 correctable or the patient has a positive Glare test, the flier should be disqualified from flying until successful surgical removal of the cataract. Waiver to SG1 may be considered after surgery provided the VA returns to 20/20 corrected, is within refraction limits, and the Glare test is negative (normal).

INFORMATION REQUIRED:

1. Ophthalmology consultation is required for initial waiver request.
2. Because of the potential for deterioration, ophthalmologic follow-up may be needed every 6 months until surgery is deemed necessary.
3. Prior to and after surgery, a Mentor Brightness Acuity Test (BAT, a glare-testing device) should be performed with VA documented for each eye separately at the low, medium and high settings.
4. Confirmation is needed of exclusion of underlying pathology such as Wilson's disease, diabetes or hypoparathyroidism.

TREATMENT: Surgery with an intraocular lens (IOL) implant usually provides a sufficiently acceptable VA result for military flying duties. Consultation with NAMI ophthalmology prior to surgery is recommended.

DISCUSSION: The visual effect of a cataract depends on its encroachment on the visual axis and the proximity to the nodal point. A posterior subcapsular cataract can have a devastating effect on vision. 2 to 3 episodes of serious dehydration can increase the risk of developing a cataract 21 fold. Surgical success of greater than 90% in achieving a 20/40 best corrected VA after 1 year has been reported. The RAF restricts the flying of personnel with IOL from high performance aircraft and helicopters. This is because of the risk of pressure on ciliary body blood vessels under high Gz or vibration and because of the unknown long term effect on the corneal epithelium.

ICD-9 CODES:
366 Cataract
366.1 Posterior Sub-Capsular Cataract (senile)
366.20 Traumatic Cataract
366.45 Drug induced Cataract
743.30 Congenital Cataract

12.2 COLOR VISION ABNORMALITIES

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AEROMEDICAL CONCERNS: Color vision is required to accurately identify warning lights and color visual displays in the cockpit, airfield and shipboard lighting, colored smoke in combat, ground target identification, and aircraft formation lights. Interactions with other optical devices, such as laser eye protection glasses and protective visors may worsen color vision problems. For testing purposes, proper instructions and lighting are critical to accurate results. Best corrected spectacles are recommended, but no tinted or colored lenses may be worn during testing, as that will decrease the sensitivity of the test for detecting color vision deficiency.

WAIVER: Applicants are CD, no waiver if the applicant cannot pass the required color vision tests. Certain non-aviators require adequate color vision, including ATC, UAV, and sonar display operators (anti-sub aircraft). Waivers have been granted for aeromedical and other Class II aircrew applicants on a case-by-case basis. Waivers for designated personnel with a change in color vision may be considered on a case-by-case basis.

COLOR TESTS:

1. Pseudo-Isochromatic Plates (PIP) are considered a primary test of color vision. Approved: **Ishihara 38-plate edition**, **Pseudoisochromatic Ishihara Compatible (PIPIC) 24-plate edition**, **ColorDx Standard 24-Plate Edition.**
   a. Scoring: 12 (or more) of 14 correctly identified red/green numerical test plates constitute a passing score. Passing criteria is 12 or more plates correctly read, i.e., no more than 2 errors.
   b. Use one demonstration and 14 test plates (the orange number on page one is a demo plate only, and not a test plate, and should not be counted). **Directions:** Best corrected vision, Daylight Illuminator stand or a light source ~ 6500 degree Kelvin temperature “Daylight” fluorescent bulb, three seconds each page, no tracing allowed, random order. Regular white incandescent bulbs may not be used, as they are the incorrect color and reduce the sensitivity of the test.
   c. Other editions of pseudoisochromatic plates may not have the correct types of plates (numbers only required). Research has shown that individuals scoring 11 (or less) on the PIP test do not have normal color vision.

2. **Farnsworth Lantern** (FALANT), The Farnsworth Lantern was designed in the 1940’s to pass mildly color vision deficient individuals for Naval submarine service. Passing the FALANT does not ensure normal color vision. Original model or modern Optec 900 accepted. Certain aviation classes may not use FALANT (per MANMED).
   a. Passing criteria for FALANT remains 9 of 9, or 16 of 18 correct responses. **Directions:** normal room lighting, best corrected vision worn, both eyes open, 8 foot test distance, random presentation of targets, two seconds each target. Prior to testing, read the instructions to the patient exactly as written on the side of the unit to ensure predictable responses, and follow all directions on the guide.
   b. The FALANT will be phased out eventually from all classes, but those designated and student aviators who have passed the FALANT prior to phase-out will be grand-fathered for their career, unless a documented color vision degradation requires further evaluation to exclude progressive or acquired disease.

3. **Computerized Color Vision Tests** (CCVT) may be either used as a primary test of color vision, or may be used as a backup test for PIP or FALANT failures.

Computerized Tests (validated and approved):

a. **ColorDX** (Waggoner): A score of "normal" or "mild" color vision deficiency in red, green or blue is acceptable for aviation. Tested binocularly (both eyes open). May test monocularly for isolating and tracking acquired color vision defects.
b. **Colour Assessment & Diagnosis** (CAD, City University London): A score of less than or equal to 6 CAD units for all three cone types in each eye. Tested binocularly (both eyes at the same time).
c. **Cone Contrast Test** (CCT, Rabin): A score of 55 or greater in each eye is required for all three cone types. This test is given monocularly (one eye at a time).
d. Computer tests shall be administered per manufacturer recommendations with regard to distance, lighting, screen calibration, and monocular or binocular testing. Best correction worn. Computerized tests must be utilized per manufacturer's instructions; such as administration processes and calibration, room lighting, and screen brightness. Computer-printout grade sheets should be submitted with the physical exam, to ensure objectivity and correctness.

INFORMATION REQUIRED: If a designated crewmember fails the PIP, and either a FALANT or computerized test (worse than mild defect), an ophthalmologic evaluation is required to screen for acquired pathology. Additionally, a practical test of color vision must be performed, and administered with the objective oversight of the flight surgeon, type standardization instructor, and type NATOPS officer as observers. Tests would include identification of cockpit lighting, gauges, safety indicators, cockpit display symbology, map symbology for both cockpit and actual charts (hazards/obstacles, airspace coordination areas, route markings, etc.), identification of shipboard and landing field lighting, and ALDIS lights. For Marines, smoke color identification testing is also required. A control group of two additional aviators with normal color vision is recommended for comparison. Commanding Officer endorsement is required.

TREATMENT: N/A.

DISCUSSION: Defective color vision is overwhelmingly congenital, and mainly involves red and green cones, due to X-linked genetics. Blue cones are encoded on Chromosome 7. In Caucasians, approximately 8% of males have inherited red/green color defective vision. Of males, 2% of the population have only two cones, "dichromats", and are severely deficient. The majority of color deficient individuals have three cone types, "trichromats", but are red or green weak. Moderate to severe color deficient individuals have increased difficulty interpreting VASI and PAPI lights' correctly, as well as difficulty with navigation and shipboard lighting and colored smoke identification. Color deficient individuals also take a longer time to interpret color signals and targets, while also making more errors, than individuals with normal color vision.

Blue color deficiency may be acquired by ocular diseases, including cataracts, optic neuritis, macular degeneration, central serous retinopathy, or side effects of medications or toxins.

Mild color vision deficiencies are considered acceptable for safe flight. Moderate-to-severe red-green abnormalities are the most problematic for aviation, and those individuals can sometimes pass the FALANT. Any degree of color vision deficiency, even mild, should always be considered as a potential causal or contributing factor in mishap investigations.

ICD-9 CODES:
368.5 Color Vision Abnormalities

12.3 DECREASED VISUAL ACUITY

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AEROMEDICAL CONCERNS: Decreased visual acuity degrades lookout and target acquisition.

WAIVER: A waiver for visual acuity less than standards may be considered in designated individuals, provided the central and peripheral retina is normal and all other visual standards are met.

Category	Unaided Visual Acuity	Refractive Limits	NATOPS Restrictions
SG1	20/100 or better each eye	None	None
SG2	20/200 or better each eye	None	* Restricted from shipboard duties including VSTOL * Helicopters OK
SG3	20/400 or better each eye	None	* Dual Controlled only * Requires SG1 or 2 onboard * Pilot in Command is included

Consider whether a waiver is actually required. An aviator whose vision is worse than 20/400 will need a waiver to fly in any Service Group. A clear justification is required, including primary type of aircraft in which he or she will be flying and the number of hours in that type of aircraft.

INFORMATION REQUIRED:

1. Optometry or ophthalmology consults for any waiver request for excessive refractive error.
2. Ophthalmology consult required for cases of decreased visual acuity not due to simple myopia, hyperopia, astigmatism or presbyopia (i.e. amblyopia, optic neuritis, corneal scarring, cataracts, etc.)
3. Obtain dilated retinal evaluation at corrections greater than -8.00 diopters.
4. Progressive astigmatism should be evaluated to exclude keratoconus.

TREATMENT: Refraction by spectacles within the limits set by MANMED Chapter 15. Contact lenses are permissible for aviation personnel after optometry examination, but spare clear spectacles must be carried in flight and the aviator must demonstrate 20/20 with contact usage. Other corneal surgical procedures (not allowed by Chapter 12.15) are CD, no waiver.

DISCUSSION: Myopia is usually a progressive condition, stabilizing around age 30. Significant myopia is complicated by considerable visual distortion at the periphery of corrective lenses. Individuals with significant myopia may see halos or flares around bright lights at night and are more at risk for night blindness. Elongated globes are at an increased risk of retinal detachment and lattice degeneration. Whenever a prescription is changed, aircrew should be warned about transient visual distortion and counseled on the period of adjustment. Evidence suggests that there is no difference in civil accident rates or in Naval carrier landing accidents in pilots who require visual correction. Severe myopia tends to be a problem pertaining to Class II personnel since the entry requirements for other pilots tend to be sufficiently stringent to exclude those whose vision would deteriorate that much. The risk of retinal detachment in normals is 0.06%

over 60 years compared to 2% in 5 diopter myopes. Beyond -9.75 diopters, the risk increases to 24%. Recent studies of radial keratotomy suggest that the procedure leaves 28% of the eyes with unstable refraction and nearly all with glare problems.

ICD-9 CODES:
367.9 Decreased Visual Acuity
367.9 Ametropia [Includes Myopia and Hyperopia]
367.95 Ametropia, exceeding standards
368.0 Amblyopia

12.4 DEFECTIVE DEPTH PERCEPTION

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AEROMEDICAL CONCERNS: Although many visual cues regarding the relative positions of objects in space (depth perception) are monocular. The binocular visual reflex of stereopsis is an important indicator of normal visual acuity in each eye, with normal ocular alignment and neurological function. Defective stereopsis may make certain piloting duties such as formation flying and aerial refueling more difficult and unsafe.

WAIVER: No waivers shall be recommended for any candidate or designated Class I duty involving actual control of aircraft. Class II and III personnel must meet standards for depth perception except when remarked as "not required" under types of aviation duty specified under MANMED Articles 15-87 through 15-99.

INFORMATION REQUIRED:

1. Valid tests of stereopsis include:
   a. **Armed Forces Vision Tester (AFVT**)
   b. **Stereoacuity Plates** used with polarized viewers such as the Stereo Optical, Titmus Optical **Stereo Fly,** or **Randot**. A randomized version of these tests should be used.
   c. **Verhoeff Stereopter**: tested at 1m, eight correct of eight random presentations for passing grade.
2. A pass of any one test meets the stereopsis standard. The tests must be administered and results recorded as specified in MANMED and elsewhere in the ARWG.
3. Recent loss of stereopsis in a designated Class I naval aviator is usually due to a change in refraction or onset of presbyopia, but may also be a sign of cataract, macular or optic nerve disease, or new motility disturbance, requiring ophthalmologic or optometric evaluation. New failures to meet the stereopsis standard must be evaluated by an ophthalmologist including completion of the ocular motility worksheet (See chapter 12.14).

TREATMENT: Correct any underlying refractive error or eye disease.

DISCUSSION: Defective stereopsis is typically innate and due to abnormal visual development prior to the age of 9. The Verhoeff Stereopter tests stereovision in real space. Eight test presentations are made at a 1 meter distance, with no head movement of the patient. All eight tests must be correct for a passing score. Causes of defective stereopsis include abnormal ocular muscle balance, amblyopia, anisometropia, microtropia, and monofixation syndrome.

ICD-9 CODES:
368.33 Defective Depth Perception

12.5 HISTORY OF STRABISMUS SURGERY

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AEROMEDICAL CONCERNS: Single, fused, simultaneous binocular vision in all versions at all times with the stereopsis reflex active is a requirement for safe and effective duty involving actual control of aircraft. Congenital or acquired defects of ocular alignment as well as any surgery to correct ocular misalignment can cause mild to severe degradations to binocular vision and acuity and be a grave hazard in aviation.

WAIVER: History of strabismus surgery is considered disqualifying for all aviation duty. A waiver will not be considered for an SNA applicant, due to the risk of progressive degradation to alignment even decades later. A waiver for aviation duty other than an SNA applicant will be considered on a case-by-case basis no sooner than six months after a successful and stable strabismus surgery if post-operatively, the member otherwise meets the visual standards appropriate for his or her duty.

INFORMATION REQUIRED:

1. Submission must include an ocular motility worksheet (see chapter 12.14) completed at the time of waiver request by a provider qualified to measure all required data.
2. Include copies of all eye exams and operative report(s) with AMS.

TREATMENT: Strabismus surgery involves enhancing or retarding the action of one or more extraocular muscles in either or both eyes. An extraocular muscle tendon may be shortened (resection) to strengthen its action, or the insertion of the muscle moved posteriorly on the globe (recession) to weaken its action. Suspending the tendon on hangback sutures is an alternative to traditional recession surgery. Adjustable sutures may be employed to fine tune ocular alignment in the perioperative period. A spacer may be inserted in the muscle tendon with unusual forms of vertical muscle surgery. In general, vertical muscle strabismus surgery is more complex and problematic than horizontal muscle surgery for simple eso- or exotropia.

DISCUSSION: Ocular misalignment is always the consequence of disease and never a normal finding. Surgery on extraocular muscles is imprecise and has a risk of regressing to the original state of misalignment or progressing in effect and causing sequential overcorrection. Multiple surgeries are frequently necessary for congenital misalignment. Scarring of the globe and adnexa after muscle surgery may lead to restricted ocular movements. Vertical muscle surgery often causes or does not fully correct cyclotorsional misalignment.
Realignment of the eyes with muscle surgery does not resolve the underlying disorder in congenital misalignments and while peripheral binocular function may be partially enhanced, normal central binocular stereopsis is rarely achieved. Even after satisfactory surgical alignment in congenital esotropia, residual comorbidities such as latent nystagmus and dissociated vertical deviations are often seen. The desirable cosmetic result after strabismus surgery is 10 or fewer prism diopters of misalignment, since this relatively small degree of heterotropia is not noticeable to casual observation of the eyes. Asymptomatic vision (i.e. normal acuity without diplopia complaints) with tropia less than 10 prism diopters, meets the NOHOSH standard for Class II and III.

"NOHOSH" stands for "No obvious heterotropia or symptomatic heterophoria". "Obvious heterotropia" is visually noticeable misalignment of the two eyes in primary, straight-ahead gaze (with no head turn or tilt) or noticeable misalignment during motility testing in the cardinal fields

of gaze. “Symptomatic heterophoria” is complaints of intermittent diplopia while alert and performing tasks such as night-driving, night-flying, scanning for air-traffic in hazy skies, etc.

ICD-9 CODES:
H153 Surgery for strabismus or ocular muscle imbalance

12.6 EXCESSIVE PHORIAS

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AEROMEDICAL CONCERNS: Excessive phorias are frequently associated with defective stereopsis and/or diplopia complaints, a hazard if this occurs during a critical phase of flight.

WAIVER: CD for Class I aviators. No waivers are considered.

INFORMATION REQUIRED:

1. Evaluation by a qualified optometrist or ophthalmologist is necessary.
2. The consult should address any history of diplopia or previous eye surgery, and include all the studies requested on the accompanying ocular motility worksheet (see chapter 12.14)

ICD-9 CODES:
378.4 Excessive Phorias
378.41 Esophoria
378.42 Exophoria
378.43 Hyperphoria

12.7 RETINAL DETACHMENT

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AEROMEDICAL CONCERNS: A detached or torn retina can lead to visual impairment, the degree of which depends on the part of the retina involved and the success of any timely surgery. Some retinal repairs involve injecting gas into the eye (pneumatic retinopexy), which will restrict the patient from air transport for some time afterward.
Routine exposure to slow-onset G forces has not been shown to increase the risk of retinal detachment.
Small atrophic peripheral holes generally do not require treatment, but should be monitored for progression or subretinal fluid development over time by annual dilated examinations.

WAIVER: Waivers will not be considered in SNA applicants for retinal detachments involving intraocular repairs, vitrectomy, pneumatic retinopexy or sclera buckles. SNA applicants with small peripheral tears and/or detachments treated successfully with laserpexy may be considered on a case-by-case basis after six months with stable follow-up examinations. Waivers in other designated classes will be considered on a case-by-case basis after a minimum of three months post-operatively. Annual dilated exams will be required for any waivered retinal tear, treated holes or detachment. **A Grounding physical is required to be submitted upon diagnosis due to the post-operative observation period of greater than 60 days.**

INFORMATION REQUIRED: Please submit all relevant eye examinations and operative reports to include a Humphrey Visual Field, detailed retinal drawings, motility exam (if scleral buckling is performed), and glare testing if a pneumatic retinopexy (air injection) or vitrectomy is performed.

TREATMENT: Surgical intervention is required in most cases. The best approach will be determined by the surgeon and may consist of one or more of the following techniques cryotherapy, laser retinopexy, pneumatic injection, scleral buckling, or vitrectomy.

DISCUSSION: Visual acuity and visual field loss, changes in refractive error, motility disorders, and cataracts are frequent sequelae for retinal detachments. Detachments involving the macula have the highest impact on central vision. Annual follow-up is required for the duration of military service and recommended after separation from service.

ICD-9 CODES:
361.0 Retinal Detachment with retinal defect

12.8 GLAUCOMA & OCULAR HYPERTENSION

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AEROMEDICAL CONCERNS: Glaucoma is an optic-nerve disease characterized by a combination of two or more of the following: elevated intraocular pressures, visual field loss and/or progressive cupping of the optic nerve. It may be associated with increasing age, a family history of glaucoma, racial predilection, underlying eye conditions associated with elevated pressures, or trauma to the involved eye.

Open angle glaucoma is the most common type and is usually asymptomatic, even as vision loss is occurring slowly. Gradual, almost imperceptible loss of peripheral visual field is typically the earliest clinical manifestation with loss of central vision occurring only in the most advanced later stages of the disease. Elevated eye pressure is not always present in patients losing vision from open angle glaucoma. Roughly a third of those presenting with glaucoma have intraocular pressures (IOPs) less than 22 mmHg and some will continue to lose vision even with a lowering of their IOP with eyedrops or surgery.

Acute angle glaucoma is much less prevalent and will present in a much different manner then the open angle variety, with symptoms such as acute onset of eye pain, decreased vision, and halos around lights. Signs may include a red eye with a hazy cornea and a mid-dilated, poorly reactive pupil.

Both types require referral to the eye clinic with an acute angle attack requiring emergency referral to an ophthalmologist to reduce the risk of swift and severe vision loss. Both types of glaucoma are considered disqualifying because the risk of loss of vision and peripheral visual fields is incompatible with flight duties.

Ocular hypertension (i.e. elevated pressures in the eye, without visual field loss, or optic nerve cupping) is not equivalent to the actual diagnosis of “glaucoma”. In fact, most people with what is often considered to be high pressure (>22 mm Hg) never develop vision loss. This population, nonetheless, is at higher risk of developing glaucoma and so this condition is also considered disqualifying.

WAIVER: For the purposes of Naval Aviation, any IOP consistently (on at least 2 different exams on different days) and accurately measured above 22 mmHg by contact tonometry (applanation tonometer or tonopen), is considered disqualifying whether or not the diagnosis is simply ocular hypertension or glaucoma. Simply large optic nerve cupping alone is not disqualifying, if all other glaucoma screening tests and intraocular pressures are normal.

Any diagnosis of glaucoma is considered disqualifying regardless of IOP. “Glaucoma Suspicion” is not considered disqualifying, though patients are encouraged to undergo ongoing screening evaluations by an ophthalmologist or credentialed optometrist every six to eighteen months.

Designated: Waivers are considered on a case-by-case basis.

Applicants: Waivers will not be considered for actual glaucoma, or ocular hypertension (corrected for corneal thickness or pachymetry measurements).

INFORMATION REQUIRED:

Initial Evaluation:
A complete eye exam must include the following:

1. IOP by Goldmann applanation tonometer or Tonopen
2. Central Corneal Thickness (pachymetry)
3. Dilated fundus examination (to include comment on the cup-to-disc ratios and description of the nerves)
4. Automated visual field testing (30-2 or 24-2 SITA, standard or fast protocols are acceptable, ensure reliability of the test, and repeat any abnormal field examinations, submit ALL testing)
5. Slit lamp examination
6. Gonioscopy grading reports on the angles of the eye
7. Retinal nerve fiber layer analysis (i.e. ocular coherence tomography or OCT) is required.

Annual Waiver Evaluation:
A complete eye exam must include all of the above except:

1. Central corneal thickness
2. Gonioscopy, except when clinically indicated by the eye care professional.

TREATMENT:
The following are acceptable topical agents and non-invasive treatments:

1. Prostaglandin analogs are the initial treatment of choice due to insignificant incidence of systemic side effects.
2. Beta blockers – side effects of reduced exercise tolerance, orthostatic hypotension and loss of G-tolerance.
3. Carbonic anhydrase inhibitors – side effects of tingling in hands and feet, depression, anemia and sluggishness.
4. Sympathomimetic eye drops – side effects of hypertension, tremors, tachycardia, headache, conjunctivitis, anxiety.
5. Laser treatments to the angle of the eye (selective laser trabeculoplasy or SLT) may reduce the intraocular pressures for up to five years, and may reduce or eliminate the need for eye drops during this time. Re-treatment may be necessary, and routine follow-ups must be maintained.

Beta blockers and carbonic anhydrase inhibitors must NOT be used if there are any significant side effects, including any reduction in circulatory or respiratory function. The treating eye care professional must be mindful of the unique cardio-respiratory demands of the aviation environment, and may need input from the flight surgeon to tailor any medications. Patients must be instructed in proper drop protocols to reduce systemic absorption (e.g. pinching the lacrimal sac for two minutes to reduce migration to the nasal mucosa. Miotic drugs are incompatible with night operations due to the inability of the pupil to dilate to admit sufficient light.

DISCUSSION:
Waivers may be considered if peripheral visual field loss is minimal, and IOP is stabilized either with an acceptable topical agent as listed above or with laser trabeculoplasty. Incisional surgery, including filtration or tube shunt surgery is usually not considered compatible with safe flight operations. Continuation of the waiver requires annual submission, though eye examinations are usually conducted more frequently as determined by the treating eye doctor.

ICD-9 CODES:
365 Glaucoma & Ocular Hypertension
365.04 Ocular hypertension
365.10 Open angle glaucoma
365.20 Closed angle glaucoma

12.9 KERATOCONUS

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AEROMEDICAL CONCERNS: Keratoconus is a degeneration of the cornea leading to progressive thinning and irregular deformation. Visual acuity may eventually be reduced to the point that vision cannot be corrected to 20/20 with spectacles or contact lenses. Other symptoms may include diplopia, haze, ghosting of images or reduced ability to discern low contrast images.

WAIVER: Waivers will not be considered for applicants, but may be considered in designated personnel if correctable to 20/20 with spectacles.
Local boards of Flight Surgeons are not appropriate for this diagnosis.

INFORMATION REQUIRED FOR INITIAL AND ANNUAL SUBMISSION:

1. Current ophthalmologic/optometric exam to include:
   a. Corneal Topography
   b. Best corrected visual acuity (BCVA) with contact lenses (if used).
   c. BCVA with spectacles

TREATMENT: Contact lenses are often necessary to achieve the best vision. Advanced disease management may include a full-thickness corneal transplant, which is not waiverable. Corneal refractive surgery is an absolute contraindication in the presence of any keratoconus. Contact lens use in any aviator requires specific authorization on the aeromedical clearance form (up-chit). Please refer to section 12-16, Naval Aviation contact lens policy.

DISCUSSION: It is very difficult to diagnose keratoconus in the early stages unless a corneal topographic mapping apparatus is used. Aviators with rapidly increasing myopia or astigmatism may warrant such testing.
Keratoconus is usually bilateral but in rare cases, may affect one eye only. The symptoms usually start in the teen years. The condition is slowly progressive in 20%-25% of cases, but stabilization can occur at any time.

ICD-9 CODES:
371.6 Keratoconus

12.10 OPTIC DISC DRUSEN

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AEROMEDICAL CONCERNS: Optic Disc Drusen (ODD) is prevalent in 1% of the population. Drusen are calcified proteinaceous bodies located within the optic nerve head that may result in progressive visual field defects, and less commonly transient disturbance of visual acuity, color vision, and night vision. ODD is often found during routine exam in asymptomatic individuals and must be considered with any crowding or elevation of the optic nerve.

WAIVER: A history of ODD is considered disqualifying for all aviation duty. Due to the possibility of progressive visual field loss, a waiver will not be considered for applicants. Waivers may be considered in already designated personnel providing the member has no other optic pathology, significant visual field loss, and otherwise meets the visual standards appropriate for his or her duty.
Local Boards of Flight Surgeons are not appropriate in this situation since waivers are considered on a case-by-case basis.

INFORMATION REQUIRED:

Initial Evaluation:

1. Ophthalmology consultation is required for **initial** waiver request to confirm the diagnosis of ODD and the absence of other conditions (e.g. papilledema).
2. Complete aeromedical history to include pertinent positives and negatives (e.g. headaches, pulsatile tinnitus, hypertension, diabetes, family history of ODD).
3. Document presence or absence of visual symptoms and their operational impact (e.g. transient visual obscurations, perceived scotomas or metamorphopsia).
4. Documented exam to include stereoscopic optic disc evaluation, refraction to best visual acuity, color vision and Amsler grid testing.
5. Optic disc photos should be obtained for baseline documentation and future monitoring.
6. Automated perimetry visual field testing (Humphrey 30-2 is preferred, but 24-2 acceptable).
7. Retinal nerve fiber layer (RNFL) analysis using Optical Coherence Tomography (OCT) is required for baseline and future monitoring.
8. B-scan ultrasound (preferred) or CT to demonstrate buried drusen.

Annual Waiver Evaluation:
A complete eye exam and history must include all of the above except #8. Ophthalmology consultation is required only for initial waiver request; optometry follow-up is acceptable with submission of all required testing and documentation.

TREATMENT:
None. No evidence or definitive studies exist at this time supporting surgical intervention.

DISCUSSION:
Optic Disc Drusen is an indolent and progressive condition, with studies showing as high as 75% of those with ODD developing visual field abnormalities. Central vision may be affected with rare cases of anterior ischemic optic neuropathy or retinal bleeding from choroidal membranes. A thorough, detailed history and a comprehensive eye exam are essential to ensure that the individual has optimal nerve function. While the risk for sudden incapacitation

from visual obscuration is extremely low, there remains a constant threat to the aviator's field of vision with reduced peripheral visual cues for maintaining safety of flight.

Candid reporting of any change in visual performance by the aviator is as important as objective annual Amsler grid and visual field testing to ensure the safety of flight and mission readiness.

ICD-9 CODES:
377.21 Optic Disc Drusen

12.11 RETINAL VASCULAR OCCLUSION

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AEROMEDICAL CONCERNS: Symptoms vary and range from mild peripheral visual blurring to severe central vision loss. Onset is usually painless with rapid onset of vision symptoms within minutes to hours.

WAIVER: Waivers will not be considered in applicants. Designated personnel may be considered for waiver after vision returns to class standards, and on no further treatments or frequent follow-ups. Annual submission will be required.

INITIAL WAIVER:

1. All ophthalmology consultation notes from time of first diagnosis and subsequent visits documenting treatments and visual recovery to normal.
2. Retinal photos of baseline disease and post-treatment retina. Submit copies of any fluorescein angiography (FA) performed at the time of initial presentation, and any subsequent FA.
3. Exclusion of other pathology such as hypertension, diabetes, blood dyscrasias, multiple myeloma and dysgammaglobulinemia is required.

ANNUAL WAIVER:

1. Ophthalmology consultation required, with retinal photos, drawings and all other documentation showing stability of the disease and vision.

TREATMENT: Photocoagulation and/or intraocular medication injections are sometimes useful in central retinal vein thrombosis and in long-standing cases of branch retinal vein occlusion. Hyperbaric oxygen treatment may be considered in retinal artery occlusion, contact the hyperbaric medicine branch of NAMI for emergent treatment locations and protocols.

DISCUSSION: Macular edema occurs in 57% of cases of occlusion of the temporal branch of the retinal vein. Visual acuity improves in 60% of patients with branch retinal vein occlusion and 50% achieve visual acuity of 20/40 or better within 1 year. In central retinal vein occlusion, neovascular glaucoma develops in 15% of cases.

ICD-9 CODES:
362.3 Retinal Vein Occlusion

12.12 UVEITIS

Last Revised: APR 15 Last Reviewed: APR 15

AEROMEDICAL CONCERNS: Uveitis is the inflammation of any of the intraocular pigmented uveal tissue, which includes iris, ciliary body and posterior sub-retinal pigmented epithelium. Anterior intraocular eye inflammation (often referred to as iritis or anterior uveitis) can result in severe eye pain, photophobia, and blurred vision. Although it is usually an isolated idiopathic condition, there may be an associated underlying auto-immune disease. Eye pain, photophobia and chronic steroid use are incompatible with flight, and recurrent episodes are difficult to treat in the austere environments of shipboard duty or in far-afield outposts without ophthalmologic care available.

WAIVER: A waiver can be considered for a single episode of iritis that resolves without complication and is not associated with any underlying systemic condition. A waiver will not be considered for recurrent uveitis of any type, or for any posterior uveitis, in applicants. Any associated underlying diagnoses should be considered carefully when determining waiverability for designated persons.

INFORMATION REQUIRED:

1. Ophthalmology consult is preferred, with dilated fundus examination to exclude posterior disease. Iritis history to rule out other causative diseases. Recurrent episodes will require laboratory workup for underlying autoimmune or infectious disease.
2. Appropriate referral as necessary for any underlying systemic condition.

TREATMENT: Treatment for uveitis depends on the portion of the uvea that is affected. Anterior uveitis is usually successfully treated with topical steroids and cycloplegics to reduce pain and ciliary body spasm.

DISCUSSION: Uveitis is an inflammation of the uveal layer inside the eye. The uvea consists of the choroid, ciliary body, and iris. It provides most of the blood supply to the retina. Uveitis may be unilateral or bilateral and occurs most frequently in people ages 20-50.

Iritis is the most common form of uveitis. These patients have an intense dull pain of the eye, perilimbal injection and extreme sensitivity to light. The hallmark signs of anterior uveitis are a constricted pupil on the affected side, and “cells and flare” in the anterior chamber. WBC’s and proteins are liberated into the anterior chamber as part of the inflammatory response. In more severe cases, patients may present with keratic precipitates (white blood cell collections on the posterior corneal surface) and posterior synechiae (iris adhesions to the anterior lens capsule). Most cases of iritis are idiopathic, but blunt trauma to the eye will frequently be associated with iritis. Iritis may also be the result of an autoimmune disorder, infection, or exposure to toxins. A single episode of iritis is generally not an indication for further testing to determine a systemic cause, however, recurrent, or persistent iritis warrants further work up.

Posterior uveitis is an inflammation of the choroid and/or ciliary body (inflammation of the ciliary body, or pars planitis, is often termed intermediate uveitis, however, will be grouped with posterior uveitis for the purpose of this discussion). Patients with this type of inflammation may complain of ocular pain and/or floaters, however, are quite often asymptomatic. Comprehensive slit lamp examination may reveal an inflammatory response (“cells and flare”) in the posterior chamber. The severity of the response may result in a “snow banking” or “snowball” appearance, and resultant scarring can form, leading to vision loss.

Possible underlying conditions may include:

Toxoplasmosis	Histoplasmosis	Tuberculosis
Sarcoidosis	Syphilis	AIDS
CMV	Ulcerative colitis	Rheumatoid Arthritis
Herpes Zoster	Ankylosing Spondylitis	Behcet Syndrome
Reiter Syndrome	Lyme Disease	

Standard lab tests include:

CBC with differential	ANA	HLA-B27
RF	ACE	PPD
FTA-ABS	Lyme titer (if appropriate)	RPR

ICD-9 CODES:
364.3 Uveitis

12.13 PTERYGIUM

Last Revised: APR 15 Last Reviewed: APR 15

AEROMEDICAL CONCERNS: A pterygium is an elevated patch of subconjunctival tissue that extends from the medial canthus onto the cornea. The slow, progressive encroachment of a pterygium upon the cornea may lead to progressive astigmatism and refractive error that may not correct with spectacles. Pterygia may also cause irritation of the cornea and conjunctiva, resulting in complaints of a red, scratchy, dry eye. The use of UV protective lenses may reduce the likelihood of pterygium growth and irritation.

WAIVER: Asymptomatic ptyergia up to and including 1.0 mm corneal invasion (measured from the limbal border at the slit lamp) are NCD for both applicants and designated aviation personnel, provided vision corrects to 20/20 with spectacles.
Designated aviation personnel with symptomatic pterygia or pterygia greater than 1.0 mm are CD but a waiver will be considered if vision corrects to 20/20 with spectacles and symptoms, if present, are controlled with conservative measures such as artificial tears. If a pterygium requires surgical removal, a waiver may be considered when the member's vision has stabilized and is correctable to 20/20, post-op complaints have resolved, and the member is returned to full duty by the operating surgeon. Aviation applicants with pterygia greater than 1.0 mm are NPQ with waiver not recommended.

INFORMATION REQUIRED:

1. Ophthalmology or optometry consult to include:
   a. Drawing or clear description of the pterygium and the amount of encroachment on the cornea.
   b. Manifest refraction documenting visual acuity corrects to 20/20 with spectacles.
   c. Documentation of any symptoms (e.g. tearing, irritation, etc…) and any treatments.
2. Post-op patients also must also submit:
   a. Operative report.
   b. Clearance for full duty by operating surgeon.
   c. Post-op manifest refraction documenting visual acuity corrects to 20/20 with spectacles.
   d. Documentation of absence of post-op complications or complaints.

ICD-9 CODES:
372.4 Pterygium

12.14 OCULAR MOTILITY WORKSHEET

OCULAR MOTILITY WORKSHEET

* Exam and the reporting of results MUST conform with the instructions on the back of this form *

Pertinent History

Distant Visual Acuity OD 20/ OS 20/	**Manifest Refraction** OD_____ Corrected to 20/ OS_____ Corrected to 20/
Cycloplegic Refraction (as needed) OD_____ 20/ OS_____ 20/	**Habitual Rx** OD_____ OS_____ Prism (if any in specs):_____

Correction used for remainder of examination ❑ Habitual ❑ Manifest ❑ None

Cover Test

Far: (all gazes)	R				L	Near (all gazes)	R			L

Extraocular Motility	**Maddox Rod or Von Graefe Prism Diopters**	**Stereopsis (Verhoeff, Randot, or Titmus) Arcseconds**
Worth 4 Dot @ 20 feet	**Vectograph (if available)**	**Red Lens Test**
4$^{\Delta}$ Base Out (microstrab)	**Other test results (as applicable)**	

Impression:		**Is patient NOHOSH?** ❑ Yes ❑ No
Provider	**Date**	**Provider Phone**
Patient Name		**SSN**
Rank/Rate	**Unit/Address**	

INSTRUCTIONS FOR OCULAR MOTILITY WORKSHEET

IF YOU HAVE ANY QUESTIONS PLEASE CALL NAMI OPHTHALMOLOGY AT DSN 922-4558 OR COMMERCIAL (850) 452-2933, or
Email: usn.pensacola.navmedotcnamefl.list.nami-ophthal@mail.mil

PERTINENT HISTORY: Explain why the workup is being done. For example: "scored 7 esophoria on AFVT" or "muscle surgery OS at age 6 years."

REFRACTION: SNA applicants need a cyclopentalate 1% cycloplegic refraction recorded, all others require a manifest refraction only. SNA applicants who see less than 20/20-0 on the Goodlite Chart unaided also require a manifest refraction recorded.

HABITUAL RX: Record the subject's habitual Rx here if different from the manifest. If none is used, or the subject wears contact lenses, please note on the form.

COVER TEST: Report **numerical** prism diopter values. Do horizontal and/or vertical as applicable to the case. Horizontal limits are approximately 45 degrees to the left and right of center. Vertical limits are approximately 25 degrees above and 35 degrees below center. Limits may need to be modified as dictated by the size of the nose and brow.

EXTRAOCULAR MOTILITY: Give description, such as "Smooth and full."

MADDOX ROD/VON GRAEFE: Report **numerical** prism diopter values for **both** horizontal and vertical phorias. Fixation target must be at 20 feet.

STEREOPSIS: Verhoeff, done at 1 meter in a normally lit room. Neither the device nor the patient should move during the test. Randot or Titmus stereo testing acceptable, do not allow head movement. Report in Arcseconds.

WORTH 4 DOT: Perform at **both** distance and near. Report "fusion," "diplopia," or "suppression OD (or) OS."

VECTOGRAPH: (If available) Test on the 20/40 (V O C S R K 4) line of the A.O. Vectographic slide. Report any suppression, and which eye is suppressing. If there is no suppression, state so. If not available, put "Not Available".

RED LENS TEST: (If available – Required for USAF) Test all 9 position of gaze, just like the cover test. Report any diplopia. If no diplopia is reported, state so.

4^{Δ} BASE OUT TEST: This test is not always applicable and may be left blank if not used. Prism introduced over either eye to look for suppression. Can augment the diagnosis of microstrabismus.

NOHOSH = **N**o **O**bvious **H**eterotropia **o**r **S**ymptomatic **H**eterophoria. Answer this question if the subject is NPQ (Not Physically Qualified for SNA (Student Naval Aviator), but would consider applying for the SNFO (Student Naval Fight Officer) program.

PROVIDER PHONE NUMBER: Indicate **both** DSN (military) and commercial.

Acronyms/definitions:
NAMI: Naval Aeromedical Institute (Pensacola, FL)
AFVT: Armed Forces Vision Tester
SNA: Student Naval Aviator
SNFO: Student Naval Flight Officer
Verhoeff: Specialized manual stereo tester.

12.15 CORNEAL REFRACTIVE SURGERY (PRK/LASIK)

Last Revised: APR 15 Last Reviewed: APR 15

AEROMEDICAL CONCERNS:

Definitions:

Corneal Refractive Surgery (CRS): A laser is used to reshape the anterior corneal surface reducing refractive error and reliance on spectacles or contact lenses. A "wavefront-guided" (WFG) or "custom" procedure uses wavefront analysis technology, and may improve the visual outcome of the procedure.

Photorefractive Keratectomy (PRK) or Laser-Assisted Epithelial Keratectomy (LASEK): Laser energy is applied to the anterior corneal surface after the epithelium is temporarily displaced or removed. No corneal flap is created. PRK variants include LASEK (epithelium is preserved), and Epi-LASIK (epithelial flap is created). Pain can be moderate to severe, and visual recovery can take months.

Laser in-situ keratomileusis (LASIK): A cornea stromal flap is created with a surgical blade or infrared laser after which, an excimer laser is used to reshape the exposed corneal stroma. The corneal flap is then repositioned. Pain is minimal and vision recovery is much faster than PRK.

All forms of refractive surgery are disqualifying for aviation duty, but waivers are readily granted if the member meets all waiver guide policy guidelines. Designated members who undergo refractive surgery shall be grounded at the time of surgery, but a grounding physical is not required. Designated members shall not return to flight duty until a Local Board of Flight Surgeons (to include one eye provider) recommends a waiver via an Aeromedical Summary (AMS) and issues a ninety-day temporary aeromedical clearance notice.

Both PRK and LASIK are waiverable at this time (see specific sections below).

All other forms of refractive surgery, or any vision or corneal manipulation or surgery, including **RK** (radial keratotomy), **LTK** (laser thermal keratoplasty), **ICR** (intracorneal ring), **ICL** (intraocular corrective lens), and clear lens extraction, are **permanently disqualifying (CD/WNR)** for all aviation duty Class I, II and III personnel. The prior use of orthokeratology (rigid contact lens corneal reshaping) is NCD provided that it is permanently discontinued prior to obtaining flight status and all appropriate refractive standards are met with stable topography.

PRK AND LASIK GENERAL GUIDELINES (applicants and designated personnel)

1. Post-operatively, the member must still pass all MANMED vision standards for their class or applicant status, and must wear corrective lenses while flying, if required, to achieve the vision standard.
2. Refractive stability and a satisfactory postoperative slit lamp exam are required. Trace, stable, peripheral haze that is not visually significant, is not a hindrance to waiver. Brightness acuity testing is required for any corneal haze.
3. There must be no symptoms or conditions that would be cause for concern during flight duties, including, but not limited to: post-operative discomfort requiring ongoing care, moderate or severe dry eye requiring the use of artificial tear drops more than 4 times per day or punctal plugs, recurrent corneal erosions, or visually significant glare, haloes or starbursts.
4. A subsequent PRK or LASIK enhancement or "touch-up" must meet the same timeframe and clinical guidelines, and requires a second waiver submission package and AMS.
5. Wavefront-guided LASIK ("Custom LASIK") is preferred in aviation personnel, as custom treatment may increase visual acuity and final vision outcomes, but in no way is required for a waiver recommendation, as not all patients are candidates for custom treatments. LASIK may reduce the risk of significant haze symptoms, which can occur after PRK. LASIK also reduces the operational down-time before a waiver application may be submitted for designated aviation personnel. The final decision of performing PRK or LASIK is made by the operating ophthalmologist with the patient's informed consent.
6. Copies of pre-operative, and post-operative examination paperwork, including the laser treatment reports, are required for waiver considerations. NAMI may request additional information as deemed medically necessary to make a waiver determination.
7. For PRK and LASIK waiver renewal, submission is as stated in the member's BUMED waiver letter. All new refractive surgery waiver approvals will usually only require routine five-year submission.

Applicants only:

1. **Applicants** may not have more than 3D of pre-operative cylinder and 3.5D of pre-op anisometropia, and must satisfy the above general guidelines, as well as the following guidelines:
   a. **SNA applicants** shall not exceed pre-operative refractive limits of +3.00 to -8.00 (SE) for either PRK or LASIK, and must additionally have a post-operative cycloplegic refraction using cyclopentolate performed at a military installation.
   b. **Class II & III applicants:** pre-operative refractive error shall not exceed +6.00 to -8.00 (SE) for PRK or LASIK.
   c. **Civilian applicants** must obtain PRK or LASIK at their own expense at a civilian refractive surgery center. DoD instruction 6130.03, enclosure 4, requires a six month minimum wait time before submitting LASIK or PRK waiver requests for civilian accessions. All paperwork and operative reports must be available and submitted for waiver consideration.
   d. **Active duty applicants** with a normal and stable post-operative course who are applying for aviation programs (i.e. STA-21, UAV operator, NFO/SNFO to SNA transition, etc.), may be considered for waivers at 3 months, with due consideration for all MANMED and ARWG policies and guidelines.
   e. **Active duty applicants** may have astigmatism correction up to 6D of cylinder, per FDA limits on the respective laser platform utilized. ***Programs leading to a commission must still adhere to the 3D cylinder limit.***
   f. **Active duty aviation students** (SNA, SNFO, etc.) who are authorized to undergo refractive surgery by the aviation training command may be considered for waivers at

3 months. Active duty members require treatment at a military refractive surgery center. Aviation students may have astigmatism correction up to 6D of cylinder, per FDA limits on the respective laser platform utilized.

Active duty aviation personnel only:

Designated aviation personnel must satisfy all the above general guidelines and the following guidelines:

1. A PRK waiver request may be submitted after the following wait periods:
   a. myopia -6.00 diopters or less spherical equivalent (SE): 3 months
   b. myopia greater than -6.00 diopters SE: 6 months
   c. hyperopia SE: 6 months
2. A LASIK waiver request may be submitted after the following wait periods:
   a. myopia correction up to -11.5D SE: 2 weeks
   b. hyperopia up to +4D SE: 4 weeks
   c. hyperopia greater than +4D SE and up to +6D SE: 8 weeks
3. If still requiring prescription topical medication (artificial tears, or cyclosporine drops excluded) then restriction of flight activities to the local area is recommended.
4. Class I aviators, specifically, must undergo PRK or LASIK treatment at one of the USN designated refractive surgery centers which have Navy ophthalmology staffing (includes Tripler AMC, Keesler AFB, or Wilford Hall). Check for a current listing if considering a non-Navy facility since staffing may change.
5. Class II, III, and other active duty flight personnel (e.g. UAV personnel, select passengers) may undergo PRK or LASIK at any DoD refractive surgery center.
6. For PRK, pre-operative refractive limits are per the FDA limits for the particular refractive laser platform utilized, for already designated personnel within their aviation class. For LASIK, waivers may be granted for myopia up to -11.5D spherical equivalent (SE), hyperopia up to +6.00D (SE), and up to 6D of cylinder (astigmatism correction).
7. For both PRK and LASIK, the PRK AMS template (available on the NAMI waiver guide website) may serve as a Local Board of Flight Surgeons, requiring review and endorsement by two flight surgeons, plus an eye care provider (military optometrist or military ophthalmologist), and commanding officer cognizance. A ninety-day aeromedical clearance notice may be issued at that time, pending BUPERS waiver approval. Submit the AMS and waiver package immediately to NAMI to avoid unnecessary delays in obtaining BUPERS final approval.
8. No deployment for at least three months following PRK and one month following LASIK surgery (per NAVMED POLICY 08-008, dtd 10 JUN 2008). Post-operative operational training requirements (such as CS gas, pepper spray, water survival training, etc.) may be performed per ophthalmologist guidance.

Select Reserve designated aviators:

Reservists must satisfy all the above general guidelines and the following guidelines:

1. May obtain PRK or LASIK at their expense from civilian sources of care.
2. A pre-operative evaluation is strongly encouraged to be submitted to NAMI Ophthalmology before corneal refractive surgery is performed. Contact NAMI Ophthalmology at 850-452-2933 or usn.pensacola.navmedotcnamefl.list.nami-ophthal@mail.mil.
3. Final approval to proceed with PRK or LASIK requires written permission from the unit commander and unit flight surgeon.

REFRACTIVE SURGERY DISCUSSION:

The goal of corneal refractive surgery is to reduce or eliminate dependence on spectacles or contact lenses, which can be bothersome at times while flying. Refractive surgery has been studied extensively in the aviation environment and has yielded highly satisfying results. More than 95% of Naval Aviators reported "increased effectiveness" after undergoing refractive surgery.

Wavefront guided (WFG), or "custom" refractive surgery has been evaluated by the Naval Refractive Surgery Center and yielded results that are superior compared to conventional treatment. Based on this analysis, aviation personnel should undergo a wavefront-guided or custom procedure, if at all possible. Some patients are not candidates for a wavefront-guided treatment or LASIK for various reasons, and conventional or PRK treatment remain viable options.

As with any surgical procedure, there are inherent risks, such as quality of vision deficits (e.g. halos and glare at night), haze, flap complications and persistent eye discomfort (e.g. dry eye or recurrent erosions). A detailed description of the risks, benefits, and alternatives should be discussed and consented between the patient and their refractive surgeon.

Undergoing PRK or LASIK does not guarantee qualification for aviation. The member must meet pre-operative standards in MANMED and this waiver policy guide. Post-operatively the applicant must meet all MANMED vision standards appropriate to their aviation class.

When obtaining corneal refractive surgery it is incumbent upon the member and the member's commanding officer and flight surgeon to be aware of corneal refractive surgery waiver recommendations at the time of the surgery and subsequent submission. Rapidly evolving technology results in changes to waiver guidelines when appropriate. Every effort will be made to publish new regulations widely, but the only valid source of current recommendations shall remain the Manual of the Medical Department. When in doubt, NAMI ophthalmology remains available for consultation through phone or email: 850-452-2933; usn.pensacola.navmedotcnamefl.list.nami-ophthal@mail.mil

ICD-9 CODES:
P1177/H1177 PRK
P1171/H1171 LASIK

The following table outlines recommended wait times for activities after refractive surgery. Please contact your local Eye Provider or the NAMI Eye Department for more information.

***NOTE: ICLs are NOT approved for any class of Naval Aviation, including Unmanned Aerial System Operators.

LASIK: Laser-Assisted In-Situ Keratomileusis
PRK: PhotoRefractive Keratectomy
ICL: Intraocular Corrective Lens (*** not approved for flight duties)

	ICL***	LASIK	PRK
Showering or washing face.	No restriction. Note: You should always avoid getting water in the eyes, and pat the eyes dry (do not rub the eyelids)		
Air travel as a passenger	3 days		5-7 days (after removal of bandage contact lens)
Aerobic activity (walk, run, bike, exercise machines) or weight training. Notes: Avoid getting sweat, dust, or wind in eyes.	2 weeks	As soon as pain and light sensitivity have resolved: 1-2 days.	As soon as pain and light sensitivity have resolved: 3-5 days.
Bending over (toe touches, sit-ups)	2 weeks	No restrictions.	
Contact sports: Martial arts, basketball, boxing, wrestling	1 month. Note: There is a lifelong risk of opening surgical wounds with trauma to the eye. If you resume these activities, you must wear eye protection.		1 month. Optional eye protection should always be considered in contact sports.
Exposure to hot tubs, pools, lakes, ocean, river	1 month Note: Risk of infection from contaminated water		
Wearing eye make-up, including camouflage face paint	2 weeks Note: Infection risk from contaminated make-up. When make-up use is resumed, start with new, freshly opened products. Old eye makeup should be discarded.		
Working in a dusty or dirty environment: outdoor rifle range, deploying to the field, gardening	1 month	2 weeks	1 month
CS exposure (gas chamber) or OC spray (pepper spray) exposure	3 months		6 months
Driving an automobile or motorcycle with goggles or face shield	When patient meets the visual acuity requirements, and feels comfortable.		
Wearing UV protection (sunglasses)	Wear UV protection whenever practical.		Full time first month, as much as possible the 2nd-4th months, and whenever practical afterwards.

12.15A LASIK IN DESIGNATED AVIATORS STUDY

Last Revised: APR 15 Last Reviewed: APR 15

Class I, Class II: The LASIK Study for designated Class I and Class II personnel has been closed. Be aware that Class I personnel are required to have their LASIK procedure performed at one of the DoN Refractive Surgery Centers (including Tripler AMC and Keesler AFB, which have Navy ophthalmology support). Class II personnel may have LASIK performed at any DoD refractive surgery center, being mindful of current refractive policy limits for waivers. For designated personnel previously enrolled in the study, annual submission is required for renewal with supporting documentation per the LASIK study protocol.

12.15B LASIK IN STUDENT AVIATORS STUDY

Last Revised: APR 15 Last Reviewed: APR 15

WAIVER: The LASIK Study for Student Naval Aviators Study has been closed to new enrollees; but, LASIK is still waiverable for new candidates and students in all aviation classes. Contact Information: usn.pensacola.navmedotcnamefl.list.nami-ophthal@mail.mil, Contact Phone: 850-452-2933.

Discussion: "All-laser" LASIK is preferred, which utilizes two types of lasers: one to create the LASIK flap and another to perform the corneal vision correction. The laser flap is preferred over a metal keratome blade to reduce the risk of operative complications and enhance post-op stability. "Wavefront-guided" or custom LASIK is preferable, if available, and the patient is a candidate for such after evaluation by their surgeon. "All-laser, custom LASIK" gives a better visual outcome over conventional treatments. This has been borne out by repeated Navy research studies. Please note that no specific method of LASIK is mandatory for waiver consideration, as long as all pre- and post-op criterion and vision standards are met in Chapter 12.15 of this waiver guide.

ICD-9 CODES:
P1171/H1171 LASIK

12.16 NAVAL AVIATION CONTACT LENS POLICY

Last Revised: MAR 15 Last Reviewed: Apr 2015

All classes of Naval aviation personnel shall be allowed to wear contact lenses during duty involving flight when the following requirements have been met as outlined below, and allowed by local commander's policy in theater. A notation from the flight surgeon authorizing contact lens use is required on the aeromedical clearance notice (up-chit) DD2992. Contact lens use is not considered disqualifying (NCD). A waiver for their use is not required.

REQUIREMENTS:

1. Visual requirements specific to each class and service group must continue to be met while wearing contact lenses.
2. Near visual acuity must be 20/20 in each eye. Presbyopic personnel may use spectacles over their contacts to achieve this standard.
3. There must be no symptoms incompatible with safe flight, e.g. fluctuating vision, reduction in vision at night or under glare conditions, or discomfort.
4. Must have worn contact lenses on a daily basis without complication for a minimum of one month before their use can be authorized on the "up-chit".
5. The prescribing eye doctor must note in the patient's record that a good fit has been achieved and that no further changes are planned.
6. SCLs are not to be worn overnight while in flight training or flight status unless operationally mandated. If extended contact lens wear (greater than 24 hours) is an operational requirement, lenses may be worn for a maximum of seven consecutive days. Personnel are encouraged to limit extended wear to the shortest period possible. A minimum 12 hour recovery period, during which no contact lenses are worn, shall follow each extended wear period. Rigid gas permeable lenses shall not be used overnight.
7. During aviation duties, it is the responsibility of all contact lens wearers to carry clear spectacles in a readily accessible protective case which correct the wearer's vision to all applicable standards.
8. Follow-up examinations for personnel wearing contact lenses shall be conducted at least annually by a Navy optometrist or ophthalmologist.

APPROVED CONTACT LENSES:

1. Only nationally available, FDA approved lenses and solutions are allowed.
2. Lenses of first choice shall be FDA approved silicone hydrogel contact lenses. Rigid gas permeable lenses are permissible, but strongly discouraged.
3. The following are NOT authorized:
   a. Bifocal/multifocal contact lenses.
   b. Cosmetically tinted contact lenses.
   c. Sports tinted contact lenses (e.g. amber or green).
   d. Contact lens wear for corneal refractive therapy (ortho-K).
4. The following are only authorized with an appropriate waiver:
   a. Combinations of rigid and soft contact lenses.
   b. Contact lens use for therapeutic reasons such as keratoconus or basement membrane dystrophies.

For any other questions regarding specific brands of contact lenses or waiver issues, please contact:

Phone: NAMI Eye Department at 850-452-2933
Email: usn.pensacola.navmedotcnamefl.list.nami-ophthal@mail.mil

12.17 ALLERGIC CONJUNCTIVITIS

Last Revised: APR 15 Last Reviewed: APR 15

AEROMEDICAL CONCERNS: The condition can cause blurred vision, ocular itching, burning, tearing/discharge, eyelid edema, and photophobia. These signs and symptoms, along with the use of medications with unacceptable side effects, have the potential for in-flight incapacitation and prolonged periods of grounding.

WAIVER: Chronic and perennial allergic conjunctivitis is CD for all applicants according to the MANMED. Seasonal allergic conjunctivitis in designated personnel is NCD. The member shall be grounded while symptomatic. A waiver is not required if the member is treated with an approved medication. If the condition is associated with rhinitis, see chapter 6.1, ALLERGIC/VASOMOTOR RHINITIS.

TREATMENT: Mild symptoms of allergic conjunctivitis may be relieved by cool compresses and artificial tears to flush away the allergens. Moderate to severe symptoms may require, in addition to cool compresses and artificial tears, ophthalmic antihistamines and/or mast cell stabilizers. **Only prescription ophthalmic antihistamines and mast cell stabilizers are approved for waivers**.

OTC or prescription ophthalmic vasoconstrictors, decongestants, NSAIDS, and corticosteroids are not approved. Note that ophthalmic antihistamines containing vasoconstrictors and/or decongestants are not approved. If necessary for severe seasonal allergic conjunctivitis, non-sedating oral antihistamines may also be used, see 6.1 ALLERGIC/VASOMOTOR RHINITIS for an approved list of medications.

DISCUSSION: Two forms of allergic conjunctivitis are quite common: seasonal (SAC) and perennial (PAC). SAC coincides with pollen blooms (e.g., ragweed, trees, grasses).
PAC may occur at any time or even year round (e.g., exposure to ubiquitous cat dander, chemicals or dust). The most effective treatment is elimination or avoidance of the potentially offending allergen, although this may not always be possible or practical.
Due to the potential chronicity of allergic conjunctivitis, long term use of medication may be necessary to keep the member asymptomatic for aviation duties, including nasal and inner ear functionality. The flight surgeon should be cognizant that the aviator or aircrew member may have residual allergy symptoms such as itchy, tearful eyes, runny nose, sneezing, scratchy throat and other allergic symptoms which would preclude flight until effectively treated. Ophthalmic antihistamines and/or mast cell stabilizers have minimal side effects and are approved for use in aviation personnel. Contact lenses may exacerbate the condition and should not be worn until the member is asymptomatic.

ICD-9 CODES:
372.14 Chronic Allergic Conjunctivitis
372.05 Acute Atopic Conjunctivitis

12.18 CENTRAL SEROUS RETINOPATHY

Last Revised: MAR 15 Last Reviewed: APR 15

AEROMEDICAL CONCERNS: Central serous retinopathy (CSR) is a unilateral, localized detachment of the retina in the macular region which may cause decreased or dim vision, distortion or miniature appearance of objects, and/or washed out color vision.

WAIVER: CSR is considered disqualifying (CD). Waivers will not be considered for applicants (CD/WNR), but may be considered for designated personnel. Evaluation by an optometrist or ophthalmologist is required with an annual submission.
Local boards are authorized for initial cases of CSR once condition has resolved (cleared by optometry/ ophthalmology), if less than 60 days has elapse since diagnosis, best corrected visual acuity has returned to the aviator's specific class standard, the aviator is asymptomatic to visual disturbances, and no metamorphopsias are noted on Amsler Grid testing. Recurrent cases of CSR require a new waiver to be submitted for review and approved by NAMI for each new episode (no local boards authorized). **A grounding physical is required if more than 60 days has elapsed since diagnosis without resolution.**

INFORMATION REQUIRED:

1. Slit lamp examination of the macula with 78/90 diopter fundus lens
2. Amsler grid, documenting any metamorphopsia
3. Optical coherence tomography reports (submit color scans: from diagnosis to resolution)
4. Humphrey Visual Field 10-2 (only required if laser treatment was performed)
5. Fluorescein angiography (optional, at the discretion of the treating ophthalmologist, submit if performed and photos available)

TREATMENT: CSR is self-limiting with a good prognosis. Eye exams should be performed every 4-6 weeks until the condition has resolved and vision has stabilized and returned to baseline. Ocular coherence tomography should be performed upon diagnosis and after subjective/objective findings have resolved. In certain cases, laser photocoagulation may be considered to enhance recovery, but may leave a small permanent blind spot.

DISCUSSION: Central serous retinopathy can be visually debilitating to a patient's central vision and results in normal to decreased visual acuity ranging from 20/25 to 20/200. This condition usually occurs in males (10:1), 20 to 50 years old, and is associated with type-A personalities and increased stress levels. Typically patients recover visual acuity, but a small percentage of patients may not return to 20/20. Resolution usually occurs over a course of 4-6 months, with continuing improvement in visual acuity over 24 months. Prognosis is worse for patients with recurrent or prolonged disease. Laser photocoagulation may be considered for occupational reasons, if CSR occurs in the contralateral eye, or if no resolution has occurred in more than 6 months. Laser intervention may shorten duration by up to 2 months, but typically has no effect on the final visual acuity outcome.

ICD-9 CODES:
362.41 Central Serous Retinopathy

12.19 PIGMENT DISPERSION SYNDROME

Last Revised: MAR 15 Last Reviewed: APR 15

AEROMEDICAL CONCERNS: Pigment Dispersion Syndrome (PDS) is a bilateral condition characterized by the liberation of pigment granules from the posterior iris which deposit on the anterior cornea, iris, and trabecular meshwork. PDS has the potential to increase intraocular pressure, leading to secondary glaucomatous damage to the optic nerve and reducing peripheral vision. The classic "triad" of PDS consists of pigment on the corneal endothelium (Krukenberg Spindle), trabecular meshwork pigmentation, and transillumination defects (TID) of the iris.

WAIVER: Any clinical finding of a Krukenberg spindle, trabecular meshwork pigmentation, or iris transillumination defects warrants a diagnosis of PDS, which is considered disqualifying (CD) for all aviation personnel.

Waivers are considered for designated personnel if intraocular pressure (IOP) is 22 mmHg or less in each eye, taking into account corneal thickness (corrected IOP), with no more than 4 mmHg difference between the eyes, normal Humphrey 24-2 visual fields, no glaucomatous changes present in the optic disc, and no treatment (pressure lowering drops/laser) is indicated. ***Local boards are authorized for designated personnel with normal corrected IOP, as long as no treatment is indicated, and no signs of glaucoma are present on ophthalmologic examination (normal visual fields, normal optic nerve appearance).***

Applicants presenting with a Krukenberg spindle or trabecular meshwork pigmentation, but without transillumination defects, will be considered for a waiver if the corrected IOP is 22 mmHg or below in each eye and no laser or medical treatment is indicated. Applicants with transillumination defects or a corrected IOP above 22 mmHg in either eye will not be considered for a waiver (CD/WNR) due to the high rate of conversion to pigment dispersion glaucoma in future years.

Waiver submission is required on a routine basis. If the corrected IOP is above 22 mmHg, then annual submission with a complete glaucoma screening is required. If corrected IOP measurements are above 22 mmHg by applanation tonometry on two separate occasions, or if laser/medical treatment is required for management of PDS, then the diagnosis should be converted to pigmentary dispersion glaucoma (PDG - see Glaucoma chapter 12.8).

INFORMATION REQUIRED:

Initial Waiver:

1. Eye exam by a Navy optometrist or ophthalmologist
2. IOP measurement by applanation tonometry (Goldmann)
3. Central corneal thickness measurement (Pachymetry) with IOP correction factor
4. Automated visual field (24-2 SITA)
5. Optic nerve evaluation with comment on health of neural rims, with color disc photos uploaded into AERO
6. Slit lamp examination with comment on anterior segment findings related to PDS
7. Gonioscopy to document trabecular meshwork pigmentation

Waiver Continuance:

1. Eye exam by a Navy optometrist or ophthalmologist.
2. IOP measurement with applanation tonometry (Goldmann)

3. Automated visual field (24-2 SITA)
4. Optic nerve evaluation with comment on health of neural rims, with color disc photos uploaded into AERO
5. Slit lamp examination with comment on anterior segment findings related to PDS
6. Gonioscopy, if performed

TREATMENT: Besides annual monitoring of PDS, treatment is usually not initiated if IOP is 22 mmHg or less, and there are no signs of glaucomatous changes. However, any glaucomatous changes or elevation of IOP may cause the eye provider to recommend pressure-lowering medications or laser treatments (See Glaucoma chapter, 12.8 for discussion on waivers for glaucoma).

DISCUSSION: Pigment dispersion syndrome (PDS) is a bilateral condition that typically occurs in young adult males (2:1) under the age of 45. PDS is characterized by liberation of pigment granules from the posterior iris, depositing in the anterior chamber structures. It can appear asymmetric between the eyes.

Deposition of this pigment occurs on the posterior corneal surface ('Krukenberg spindle' on the endothelium) and in the anterior chamber angle trabecular meshwork (TM). Pigment in the TM is deposited in a homogenous pattern, unlike other entities that can cause TM pigmentation (uveitis, exfoliation syndrome, melanoma, IOL-iris chaffing). Fine pigment granules can also been seen on the anterior iris surface and the anterior lens capsule. Pigment liberation occurs as a result of the posterior pigment epithelium of the iris rubbing against the crystalline lens zonules. Slit-like transillumination defects (TID) will be seen in a radial pattern in the mid-periphery of the iris when a bright light is shown through the pupil, best seen in a very dark room in the slit lamp. Pigment liberation can also occur due to ocular trauma or surgery, but TI defects will rarely be seen. The typical patient with PDS is a young, white male who is myopic with a slightly concave iris posture. It is uncommon in persons with African or Asian ancestry, but occurs in up to 2% of the Caucasian population. It appears to have incomplete penetration by way of autosomal dominant inheritance.

PDS can lead to pigment dispersion glaucoma (PDG), which is a type of secondary open-angle glaucoma. Conversion of PDS to PDG occurs in approximately 20% of PDS patients within 10 years of initial diagnosis. PDG is diagnosed when the classical triad of PDS is present (Krukenberg spindle, iris trans-illumination defects, and trabecular meshwork hyperpigmentation), along with progressive optic nerve cupping, glaucomatous visual field changes, or ocular hypertension. Treatment should be begun if the IOP is elevated, even without optic nerve degeneration or visual field abnormalities, to reduce the risk of future optic nerve damage and vision loss.

ICD-9 CODES:
364.53 Pigment Dispersion Syndrome / Pigmentary Iris Degeneration / Translucency of Iris

12.20 PERIPHERAL RETINAL DEGENERATION AND RETINAL HOLE

Last Revised: MAR 15 Last Reviewed: APR 15

AEROMEDICAL CONCERNS: Peripheral retinal degeneration and retinal holes are significant risk factors for retinal detachment, which can cause a painless, sudden loss of vision that may permanently impact peripheral and central vision. Retinal degenerations are commonly seen in highly myopic individuals and the increased risk of retinal detachment remains elevated even after corneal refractive surgery is performed.

WAIVER: Any peripheral retinal degeneration or retinal hole is considered disqualifying (CD). A diagnosis of "white without pressure" is a descriptive term for the appearance of the retina and is Not Considered Disqualifying (NCD). Guidance for designated aviation personnel and applicants are as follows:

- **Peripheral Retinal Degeneration** (Lattice degeneration, paving stone degeneration, snail track degeneration) – Annual waiver with Dilated Fundus Exam (DFE). Local boards are authorized after DFE is preformed to assess stability and rule out retinal detachment. Applicants may be considered for waivers through the NAMI waiver process.

- **Peripheral Retinal Hole** – Ophthalmology consult is required prior to waiver consideration. If the hole is considered stable with no sub-retinal fluid and treatment is not indicated, retinal holes may be considered for an annual waiver with DFE (performed by optometry or ophthalmology). Holes treated with laserpexy may be considered for an annual waiver with DFE after one month follow-up time has elapsed and the surgeon has determined stability. ***Local boards are authorized after ophthalmology determines fitness for full duty if less than 60 days has elapse since diagnosis and treatment.*** Applicants may be considered for waivers through the NAMI waiver process.

- **Retinal Tear/Detachment** – CD, ***no local boards authorized***. See Retinal Detachment Chapter (12.7) for more information and waiver guidance for applicants and designated aviation personnel.

INFORMATION REQUIRED:

1. Eye exam with DFE by Eye Care provider (Ophthalmology consult required for retinal holes) with comment on long-term prognosis
2. Detailed retinal drawings or photographs

TREATMENT: Patient education and monitoring with a comprehensive eye exam, including dilated fundus examination, is the most common course of action for patients with peripheral retinal degenerations and retinal holes. Patients with retinal holes should be further evaluated with scleral depression to ensure the stability of the hole and determine presence or absence of shallow retinal detachment. Most small, stable holes are monitored annually, but may require prophylactic laser treatment to reduce the risk of future detachment. Patients should be aware of the signs and symptoms of retinal detachment, including an increase of flashing lights, floaters, or blurry or obscured areas of vision beginning in the periphery. The patient should be educated to return to the clinic for a repeat dilation immediately if they experience these symptoms.

DISCUSSION: Peripheral retinal degenerations (specifically lattice and snail-track degenerations) are vitreoretinal changes in the retina and overlying vitreous usually located in the far periphery. The involved retina thins and becomes fibrotic, resulting in vitreous pockets (lacuna) forming above the affected areas of the retina. Lattice degeneration is clinically prevalent in 10% of patients and is usually non-pigmented, but may become hyperpigmented in 30% of cases. Half the cases of lattice are bilateral, symmetrical, and refractive error does not play an important factor in the development (seen in 15% of high myopic patients). Snail track lesions occur in up to 80% of eyes with lattice degeneration and can be associated with myopia. Although 30% of retinal detachment patients have a predisposed peripheral retinal degeneration, the clinical rate of detachment is only 0.5%. There is no evidence that prophylactic therapy reduces the risk of future retinal detachment.

Thinning of the retina may lead to the formation of atropic holes or retinal breaks in 25% of patients, but the frequency of retinal detachment as a result of retinal holes is low (3-14%). Most atrophic holes do not require any treatment since they are not associated with vitreous traction. However, upon discovery of atrophic holes, a consultation to an ophthalmologist is indicated especially with patients who have high myopia, those who are active in contact sports, or if there is a family or personal history of retinal detachment.

Retinal 'white without pressure' (WWOP) is an optical phenomenon in which vitreous traction changes the retinal coloration upon examination. WWOP is usually bilateral and observed in 5% of patients over 20 years of age, but roughly 66% in patients over 70 (30% of the total population). White without pressure is an incidental finding and there is no associated risk of retinal holes, tears, or breaks with this condition.

ICD-9 CODES:
361.31 Round hole of the retina without detachment
362.60 Peripheral retinal degeneration, unspecified
362.61 Paving Stone Degeneration
362.63 Lattice Degeneration